

**B.TECH(ECE), 2014**  
**ELECTROMAGNETICS & ANTENNAS**  
**PAPER CODE: BTEC 403**  
**PAPER ID: [A1191]**

Time: 3hrs

Maximum Marks: 60

Instructions to Candidates:

- 1) Section A is compulsory consisting of Ten questions carrying Two marks each.
- 2) Section B contains Five questions carrying Five marks each and students has to attempt any Four questions.
- 3) Section C contains Three questions carrying Ten marks each and students has to attempt any two questions.

**Section A**

Q 1)

- a. Write down the Maxwell equations in differential form.
- b. What are the two fundamental laws of electromagnetic field?
- c. Define uniform plane waves.
- d. What is a half wave dipole?
- e. State Babinet's principle.
- f. Define power gain of an antenna.
- g. Write two characteristics of End-fire array.
- h. What is a waveguide.
- i. Define the term Characteristic impedance.
- j. Define LUF.

**Section B**

- Q 2) Find the relation between  $E$  and  $H$  in a uniform plane wave. Hence find the value of intrinsic impedance of free space.
- Q 3) Find the cut-off wavelength in a standard rectangular waveguide for  $TE_{11}$  mode.
- Q 4) Establish an analogy between Transmission line and Waveguide.
- Q 5) Obtain an expression for critical frequency  $f_c$  in terms of  $N_{max}$  the maximum ionization density.
- Q 6) Calculate the power gain of an optimum horn antenna approximately with a square aperture of  $10 \lambda$ . The horn is fed by a rectangular waveguide with  $TE_{10}$  mode.

**Section C**

- Q 7) Design rectangular metal waveguide to carry only the  $TE_{10}$  mode at a frequency of 5000 MHz.
- Q 8) Write Short notes on:
  - a) Space wave propagation
  - b) Duct Propagation
- Q 9) What is the Dolph-Chebyshev distribution for linear broadside arrays. Show that its optimum distribution for obtaining beam width for given side lobe level and vice versa.